

AMENDMENTS TO THE DRAWINGS

The attached sheet(s) of drawings includes a reference numeral change to Figure 3A. In Figure 3A, element "330" should be changed to --330a--.

Attachment: Replacement sheet
 Annotated sheet showing changes

REMARKS

Claims 1-49 are presently pending in this application. Claims 1 and 18-20 have been amended in this paper to correct informalities. No new claims have been added.

In the August 9, 2007 Office Action, claims 1-49 were rejected. More specifically, the status of the application in light of this Office Action is as follows:

(A) The specification was objected to due to informalities;

(B) The drawings were objected to due to an informality;

(C) Claims 18-20 were objected to due to informalities;

(D) Claims 1, 3, 6-12, 14, 17-21, 23, 25, 26-29, 31, 34-42, 44, and 46-49 were rejected under 35 U.S.C. § 102(e) over U.S. Patent Application 2006/0125475 to Sodickson et al ("Sodickson"); and

(E) Claims 2, 4, 5, 13, 15, 16, 22, 24, 30, 32, 33, 43, and 45 were rejected under 35 U.S.C. § 103(a) over Sodickson in view of U.S. Patent No. 6,005,916 issued to Johnson et al ("Johnson").

A. Technical Objections/Rejections

The Examiner required a corrected drawing under 37 C.F.R. § 1.121(d). Applicants submit a corrected Figure 3A herewith, along with an annotated drawing sheet for the Examiner's convenience.

The Examiner objected to the specification due to informalities. The applicants wish to thank the Examiner for the suggested revisions. The specification has been amended accordingly.

The Examiner rejected claims 18-20 based upon informalities in the claims, and suggested amendments to resolve these informalities. Applicants are grateful for the Examiner's suggestions, and herein amend these claims in accordance with them.

B. Response to Section 102(e) Rejection over Sodickson

Claims 1, 3, 6-12, 14, 17-21, 23, 25, 26-29, 31, 34-42, 44, and 46-49 were rejected under Section 102(e) over Sodickson. Sodickson is directed toward a device for radio frequency impedance mapping. Sodickson discloses a device for determining dielectric properties of a body to discriminate between regions of a body, for example, between tumors and healthy tissue. [0010] For at least the reasons discussed below, Sodickson fails to disclose or suggest all the features of these claims.

Independent claims 1, 12, 21, 29, 38, and 42 are each directed to a method for calibrating a sensing array used for marker localization by "applying an excitation to at least one of said plurality of sensing elements of said sensing array used for marker localization." This recited feature is not disclosed or suggested by Sodickson. Indeed, Sodickson's determining dielectric properties of a body does not include locating a marker, but rather relies on a change in resonant properties within the body, thus, inclusion of a marker would interfere with Sodickson's recited method. Accordingly, claims 1, 12, 21, 29, 38, and 42 are patentable over Sodickson, as are their dependent claims 3, 6-11, 14, 17-20, 23, 25, 26-28, 31, 34-41, 44, and 46-49.

Furthermore, the Examiner states in the Office Action that steps 540 and 560 of Fig. 5 from Sodickson disclose the element in claim 1 of "determining corrections to a sensed signal based upon said analyzed outputs of said plurality of sensing elements." The applicants respectfully disagree. The method described in Sodickson with respect to Fig. 5 involves obtaining image information associated with the dielectric properties of a body from a coil array. (Sodickson, [0082]). In step 540, an initial trial impedance matrix may be determined. (Sodickson, [0088]). Each voxel, which describes an intensity of a region of an image, is assigned an "initial trial conductivity and/or permittivity value." The "trial values" that are assigned to each voxel may be arbitrary values or "may be assigned

according to a priori information about the body being imaged.” The trial conductivity and permittivity values, “along with the electromagnetic fields computed using Maxwell’s equations may be employed in the relationship expressed in equation 3 [see Sodickson, page 6] or to compute current amplitudes in each of the coils resulting from known applied voltages in order to compute impedance characteristics of the coil array.” (Sodickson, [0090]).

In step 550, Sodickson describes comparing the initial trial impedance matrix with a measured impedance matrix “to determine if the trial values (i.e., the dielectric distribution) assigned to the body to form the trial impedance matrix are a satisfactory description of the conductivity and/or permittivity distribution of the body as indicated by the measured impedance matrix.” (Sodickson, [0091]).

In step 560, a distance between the trial and measured impedance matrix is evaluated. (Sodickson, [0092]). If the values are close enough, “an image may be formed from the conductivity and/or permittivity values used in the formation of the trial impedance matrix.” In step 570, if the values are too dissimilar, “the conductivity and/or permittivity values assigned to one or more voxels may be adjusted such that an updated trial impedance matrix formed from updated trial values is nearer the measured impedance matrix than during the previous iteration.” (Sodickson, [0093]).

Sodickson discloses that the dielectric properties assigned to each voxel may be adjusted with any various iterative method, including “gradient descent, searching algorithms such as simulated annealing, statistical methods such as expectation maximization, or any other optimization method of solving a set of linear or non-linear equations...to converge the trial impedance matrix to the measured impedance matrix.” (Sodickson, [0094]).

Claim 1 is patentable over Sodickson because Sodickson fails to disclose or suggest all the elements of claim 1. For example, there is at least no step in Sodickson

that discloses or suggests "determining corrections to a sensed signal based upon said analyzed outputs of said plurality of sensing elements." Instead, the method employed in Sodickson iteratively updates conductivity and permittivity values, used to compute a trial impedance matrix, using known optimization algorithms until the computed trial impedance matrix and the measured impedance matrix are similar enough to form an image from the conductivity and permittivity values. At no point does Sodickson disclose or suggest a step of determining corrections to a sensed signal. Sodickson accordingly fails to disclose each and every element of independent claim 1, and thus the Section 102(e) rejection of claim 1 should be withdrawn.

Independent claim 1 is also patentable over Sodickson under Section 103 because a person skilled in the art would not modify Sodickson to determine corrections to a sensed signal based upon analyzed outputs of a plurality of sensing elements. This step has no use in Sodickson because under Sodickson an image is formed using conductivity and permittivity values that were used to produce a trial impedance matrix that was sufficiently similar to a measured impedance matrix. It is not a useful step in Sodickson to determine corrections to any sensed signal because the values that are adjusted with each iteration in Sodickson are conductivity and permittivity values used to *compute* the trial impedance matrix. Thus, no sensed signal needs to ever be corrected. Accordingly, for at least the above discussed reasons, claim 1 is patentable over Sodickson under Section 103.

Dependent claims 3, 6-11, 14, 17-20, 23, 25, 26-28, 31, 34-41, 44, and 46-49 are patentable over Sodickson as depending from allowable independent claims and also because of the additional features of these claims. Accordingly, the Section 102(e) rejection of dependent claims 3, 6-11, 14, 17-20, 23, 25, 26-28, 31, 34-41, 44, and 46-49 should be withdrawn for the reasons discussed above with reference to independent claims 1, 12, 21, 29, 38, and 42 and for the additional features of these claims.

Independent claim 38 is further directed to a method for calibrating multiple sensing arrays. The method of claim 38 includes, *inter alia*, "determining noise corrections based

upon said analyzed outputs; and using said noise corrections determined for said one of said sensing arrays in the other sensing arrays.” In rejecting claim 38, the Examiner cites steps 1160 and 1170 of Fig. 11 of Sodickson. The method of Sodickson described in Fig. 11 for finding conductivity and/or permittivity values for use as trial values in computing a trial impedance matrix employs an iterative process that is generally analogous to the process described above with respect to Fig. 5. (See Sodickson, [0138]-[0142]). Thus, the method described in Fig. 11 updates trial values according to a method of gradient descent instead of “determining noise corrections based upon said analyzed outputs,” as claimed in claim 38. Sodickson accordingly fails to disclose each and every element of independent claim 38, and thus the Section 102(e) rejection of claim 38 should be withdrawn.

Claims 39-41 depend from claim 38. Accordingly, the Section 102(e) rejection of claims 39-41 should be withdrawn for the reasons discussed above with reference to claim 38 and for the additional features of these claims.

C. Response to the Section 103(a) Rejection over Sodickson in view of Johnson

The Examiner rejected claims 2, 4, 5, 13, 15, 16, 22, 24, 30, 32, 33, 43, and 45 under Section 103(a) over a combination of Sodickson and Johnson. Johnson is directed to a device for imaging with wavefields using inverse scattering techniques, providing greater resolution than previous diffraction tomography modalities. Johnson does not correct the deficiencies of Sodickson. Each of applicant's independent claims is distinguishable over Sodickson and Johnson.

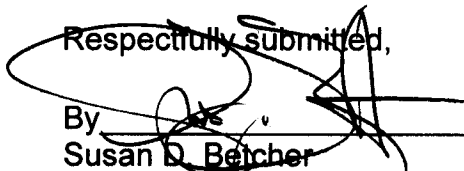
Neither Sodickson nor Johnson contains any suggestion that the sensing array is used for marker localization. Further, neither Sodickson nor Johnson contains any suggestion for “determining corrections to a sensed signal based upon said analyzed outputs of said plurality of sensing elements” as recited. Accordingly, claims 2, 4, 5, 13, 15, 16, 22, 24, 30, 32, 33, 43, and 45 are patentable over Sodickson and Johnson.

D. Conclusion

In view of the foregoing, the pending claims are patentable over the applied art. The applicant accordingly requests reconsideration of the application and respectfully submits that the claims are in condition for allowance. If the Examiner has any questions or believes a telephone conference would expedite prosecution of this application, the Examiner is encouraged to contact Susan Betcher at (206) 359-6088.

If any additional fee is due with this response, please charge our Deposit Account No. 50-0665, under Order No. 341148019US from which the undersigned is authorized to draw.

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Respectfully submitted,

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Attachments